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2,658,623

FLUID CLEANING APPARATUS

Filed April 30, 1951

3 Sheets-Sheet 1

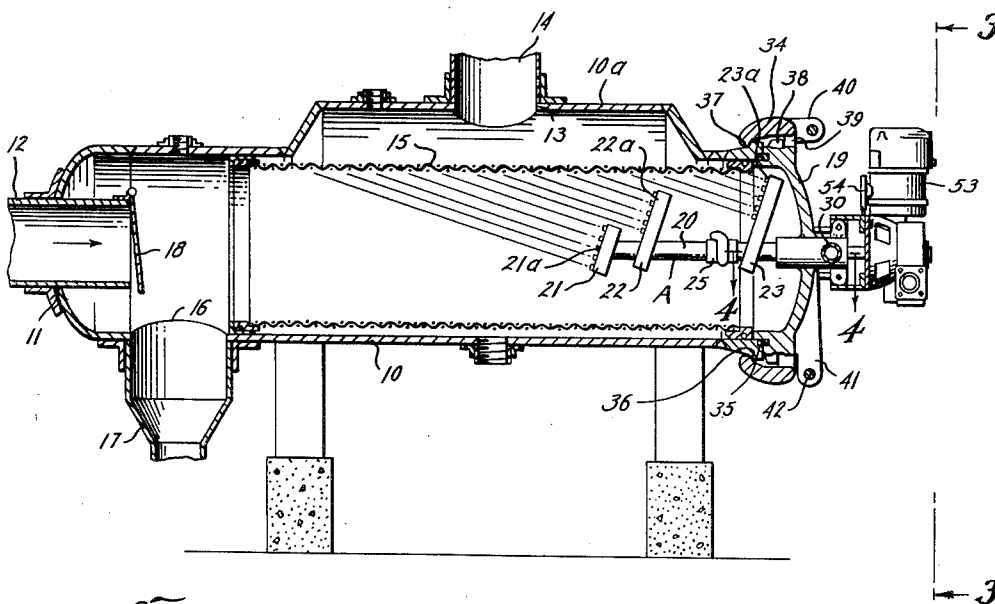
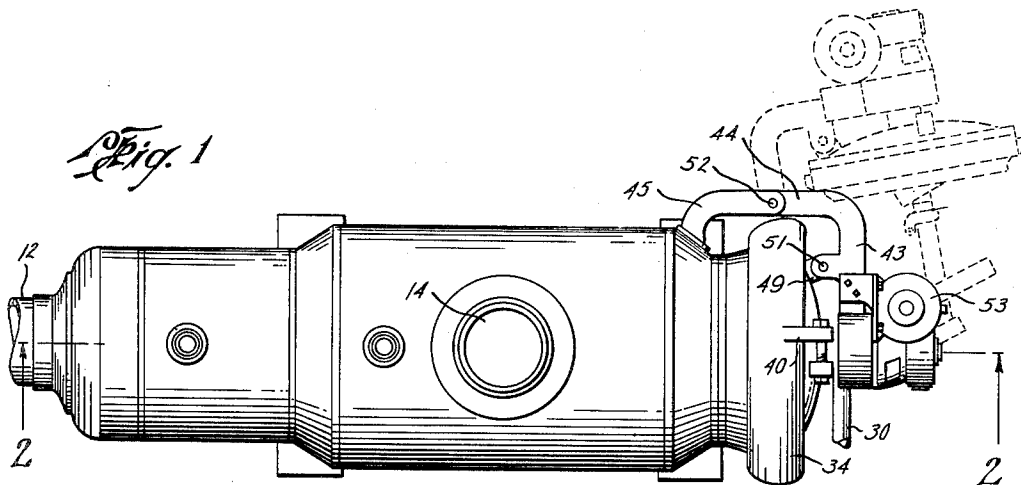


Fig. 2

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Fig. 3

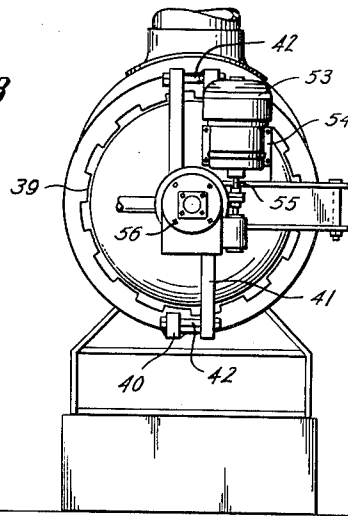
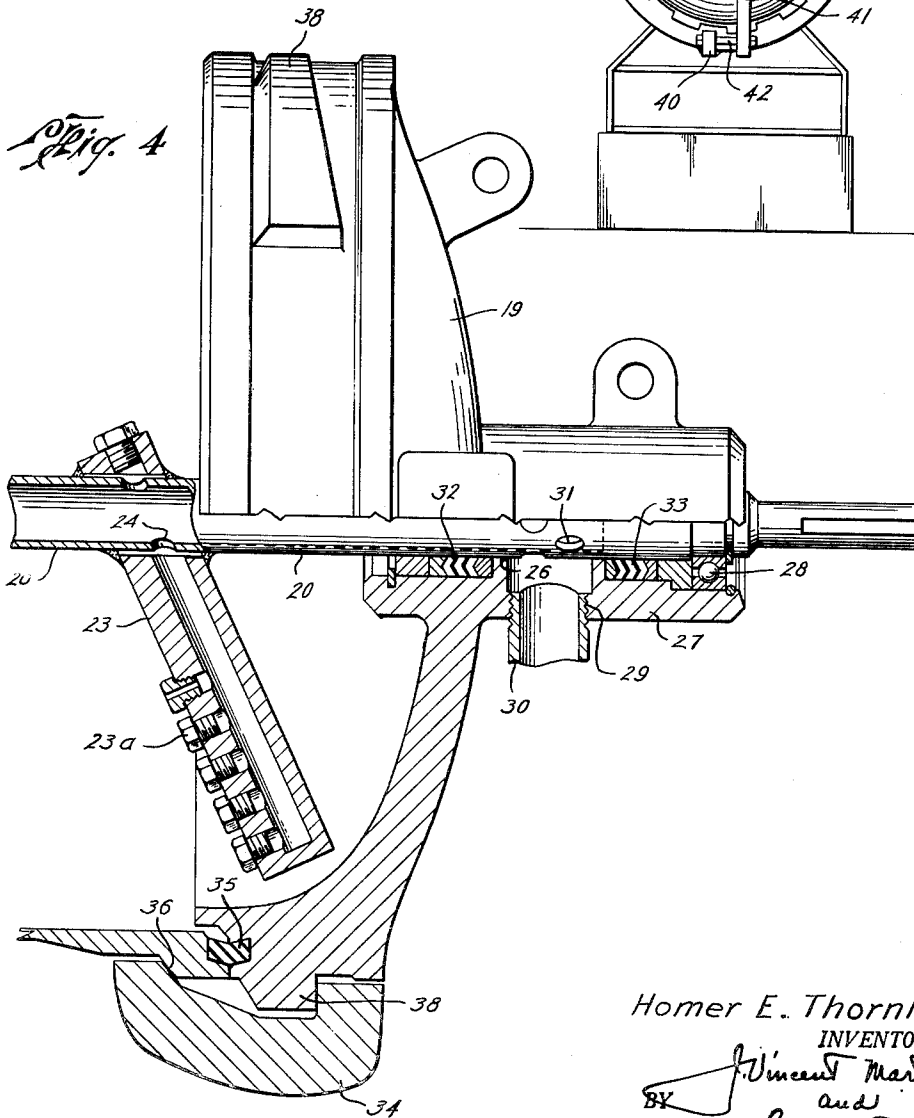


Fig. 4



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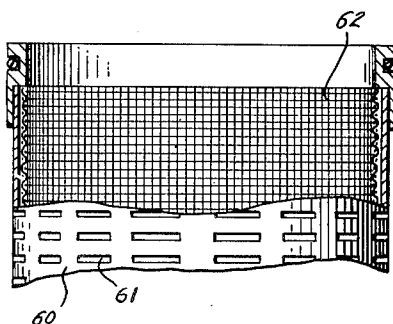
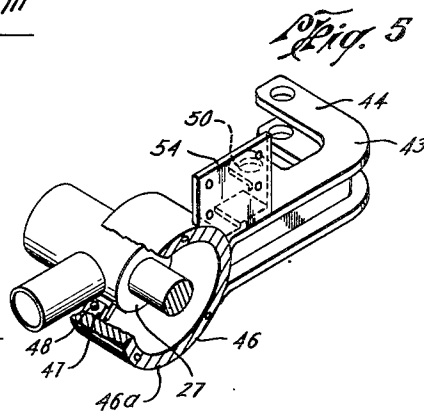
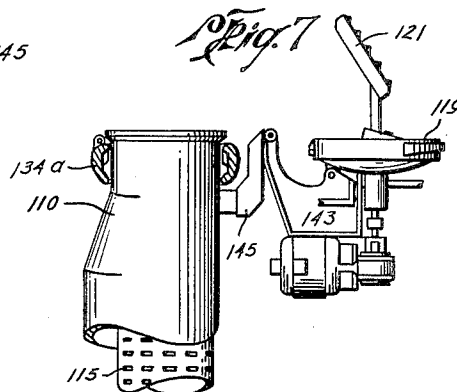
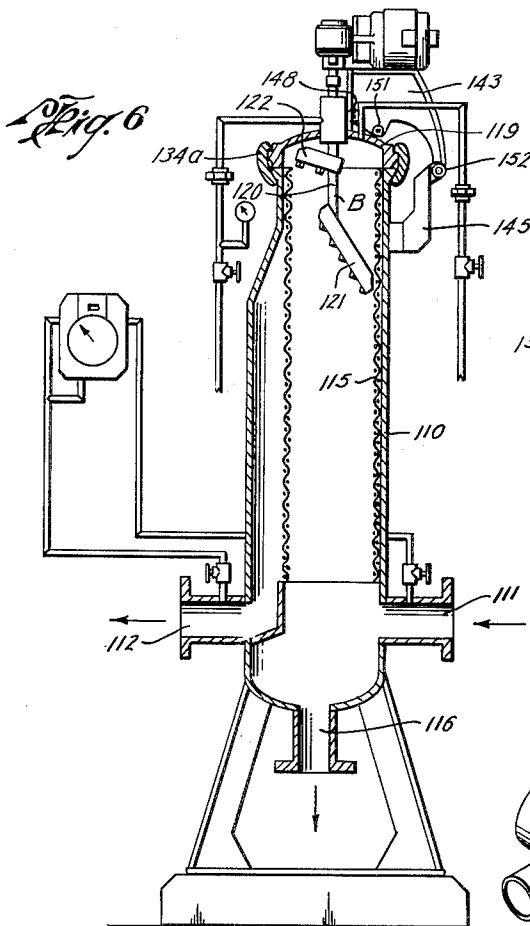
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FLUID CLEANING APPARATUS

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Application April 30, 1951, Serial No. 223,745

3 Claims. (Cl. 210-167)

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This invention relates generally to fluid cleaning apparatuses and particularly to apparatuses for removing foreign matter and solid particles from liquids moving through flow lines.

The invention is an improvement on the fluid cleaning apparatus disclosed in my co-pending application, Serial No. 131,017, filed December 3, 1949.

One object of the invention is to provide an improved arrangement for cleaning the screen or strainer in the cleaning apparatus, whereby said screen or strainer may be easily, quickly and thoroughly cleaned without removing it from the cleaning apparatus.

An important object of the invention is to provide a rotating spray head for directing streams of cleaning fluid against the interior of the screen, whereby the number of spray nozzles required may be decreased so that efficient cleaning of the screen surface may be accomplished while decreasing the volume of cleaning fluid which is necessary to properly clean said screen.

A further object is to mount the rotating spray head assembly on the end cover of the cleaning apparatus, which cover is hinged in a manner to permit the entire spray head assembly to be swung outwardly to permit access to the interior of the apparatus for periodic inspection of the screen or for replacement of said screen in the event such replacement is desired.

Still another object is to provide an improved rotating spray head assembly for cleaning apparatus which is applicable to either horizontal or vertical vessels.

Other objects will appear hereinafter.

The preferred embodiments of the invention are illustrated by the accompanying drawings, wherein:

Figure 1 is a plan view of a cleaning apparatus, constructed in accordance with the invention and illustrating the hinged cover and spray head assembly swung outwardly in dotted line position,

Figure 2 is a longitudinal sectional view taken on the line 2-2 of Figure 1,

Figure 3 is an end elevation of the apparatus,

Figure 4 is an enlarged sectional detail of the cover and a portion of the spray head,

Figure 5 is an isometric view of the hinged supporting arm for the closure and spray head assembly,

Figure 6 is a longitudinal sectional view of a modified form of the invention,

Figure 7 is a similar view of the upper portion of this form showing the cover and spray head assembly hinged outwardly, and

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Figure 8 is a partial sectional view of the cleaning screen or strainer.

In the drawings, the numeral 10 designates a vessel having an axial inlet 11 at one end thereof in which an inlet pipe 12 is disposed. The upper portion of the vessel is offset as indicated at 10a and is provided with an outlet 13 having an outlet pipe 14 connected thereto. A cylindrical screen or strainer 15 is mounted axially within the vessel between the inlet 11 and the outlet 13. The vessel is provided with a drain opening 16 having a drain pipe 17 extending therefrom and said drain is disposed adjacent the inlet end of the vessel. The end of the screen adjacent the drain is open so that foreign matter accumulating within the screen may be swept out of the screen into the drain pipe 17 and such foreign matter is swept out by concentrated streams of cleaning fluid, as fully described in my co-pending application. To prevent the foreign matter in cleaning fluid from entering the inlet pipe 12 during the cleaning operation, a pivoted baffle 18 is mounted on the end of said pipe.

The annular screen or strainer 15 extends substantially throughout the length of the vessel and that end of the vessel opposite the inlet end is closed by a suitable cover or closure 19. The inlet and outlet pipes 12 and 14 are connected in a flow line such as a pipe line, and it will be evident that the fluid directed through the vessel must pass through the screen 15 in passing from the inlet pipe 12 to the outlet pipe 14, whereby foreign matter is strained from the fluid by said screen.

In my prior co-pending application, the cleaning of the screen is accomplished by concentrated streams of cleaning fluid issuing under high pressure from circumferentially spaced nozzles which were permanently mounted in fixed radial positions at the closed end of the vessel. The present invention resides primarily in the improved spray head assembly A which is carried by the closure 19. As is clearly shown in Figures 1 to 4, the spray head assembly includes an axial tubular shaft 20 having spray heads 21, 22 and 23 mounted thereon. The innermost spray head 21 is mounted on the end of the tubular shaft and is in communication with the bore thereof whereby cleaning fluid may be directed to the nozzles 21a of said head. The spray heads 22 and 23 are mounted in the manner illustrated in Figure 4 with the interior of each head communicating with the bore of the tubular shaft through a radial opening 24 and thus, cleaning fluid may be directed through the tubular shaft 20 to the nozzles 22a and 23a of the spray heads 22 and 23.

As is clearly shown in Figure 2, the spray heads are inclined so as to position the nozzles of said heads in a manner to direct concentrated streams of cleaning fluid onto the interior surface of the screen at the desired angle. It will be evident that when the tubular shaft 20 is rotated the inclined spray heads will be rotated within the interior of the screen, and thus the streams of cleaning fluid will be caused to traverse the entire inner area of the screen for cleaning purposes. The tubular shaft 20 may, if desired, be constructed in sections which are connected by a suitable coupling 25.

The outer end of the tubular shaft 20 extends through an axial opening 26 provided in the closure or end cover 19 and extends into an annular swivel head 27. The swivel head is preferably formed integral with the cover and a suitable bearing 28 is mounted in the outer end of the bore of said head to rotatably mount the shaft 20 with respect to the head. A radial inlet opening 29 having a cleaning fluid inlet pipe 30 connected thereto is formed in the wall of the head, and this opening is in communication with the bore of the tubular shaft through a plurality of openings 31 (Figure 4). Packing glands 32 and 33 are mounted on opposite sides of the openings 31 and seal off between the swivel head and the shaft, whereby cleaning fluid introduced through the pipe 30 will be directed into the bore of the shaft 20; from the bore of the shaft, such cleaning fluid may pass to the nozzles of the inclined spray heads 21, 22 and 23.

The closure or end plate 19 is engageable with the end of the vessel 10 and is adapted to be coupled thereto by a coupling collar or ring 34. As illustrated in Figure 2, a suitable packing gasket 35 is interposed between the closure 19 and the end of the vessel. The end of the vessel is formed with an annular shoulder 36 which is engaged by an annular portion 37 on the coupling collar. The coupling collar is adapted to interlock with the closure by means of wedge lugs or shelves 38 formed on the periphery of the closure and complementary lugs or shelves 39 provided on the collar 34. The collar has outwardly extending ears 40 while the closure has extensions 41 which when the closure is in position abut the ears 40 and permit connecting bolts 42 to fasten the parts together (Figure 3). As shown in Figure 3, the lugs or shelves 39 on the collar are adapted to enter the spaces between the lugs or shelves 38 of the closure after which a rotation of the collar with respect to the closure moves the lugs 40 and extensions 41 in position to receive the bolts 42. By tightening the bolts 42, additional relative rotation between the collar and the closure is effected with the result that the wedge surfaces of the lugs 38 and 39 move the closure into tight sealing position on the end of the vessel.

The cover or closure is carried by a hinge arm 43 (Figure 5) which arm has a curved extension 44 pivotally secured to a supporting bracket 45. The bracket is welded or otherwise secured to the exterior of the vessel 10. The supporting arm 43 has the end opposite the extension 44 welded or otherwise secured to an annular flanged ring 46, which ring is adapted to surround the end of the swivel head 27. The ring is secured to the swivel head by complementary ears or clips 47 and bolts 48. In addition to the connection with the swivel head, the arm 43 is connected to ears 49 by lugs 50 and bolts 51. With this arrange-

ment it will be evident that the pivot bolt 52 which connects the supporting bracket 45 to the hinge arm 43 provides a hinge point on which the closure 19 may swing, and since the spray head assembly is secured to the closure, the entire closure and spray head assembly may be swung outwardly to the position shown in dotted lines in Figure 1.

For imparting rotation to the shaft 20 to rotate the spray heads a suitable electric motor 53, hydraulic motor or other prime mover is bolted to a supporting bracket 54, which in turn is secured to the arm 43. The motor shaft 55 has connection with a gear reduction unit 56 which unit is bolted to the flange 46a of the flange ring 46. It will be evident that when the motor is operated the spray heads 21, 22 and 23 are rotated to traverse the entire internal area of the screen or strainer 15 and to direct concentrated streams of cleaning fluid through the nozzles onto the interior surface of the screen to thereby wash foreign matter from the screen through the opening end thereof and into the drain.

The particular type of coupling which includes the collar 34 and the coacting wedges makes it possible to quickly detach the closure 19 from the end of the vessel. The closure 19 and the spray head assembly may then be swung outwardly on the hinge pin 52 and the length of the shaft 20 is in such relationship to the position of the hinge pin that the inner spray head 21 will clear the open end of the vessel. Thus, access to the interior of the vessel and to the screen 15 may be had. If for some reason the closure and spray head assembly may not be swung so that the inner spray heads 21 and 22 clear the open end of the vessel, in that case the coupling 25 may detach the two inner spray heads to allow free access to the interior of the vessel. It will, of course, be understood that the inlet line 30 may have a suitable coupling (not shown) connected therein to allow detachment of this line when the cover and assembly is to be swung.

The particular arrangement of the spray heads makes it possible to utilize a minimum number of spray nozzles in order to effectively clean the interior of the screen. It is evident that by providing for a rotation of the nozzles a lesser number of nozzles may be employed while still traversing the entire interior of the screen, and this results in a lesser amount of cleaning fluid being necessary to accomplish the cleaning operation.

In Figures 1 to 5, the invention has been illustrated as applied to a horizontal vessel, but it is also applicable to a vertical vessel. Such an arrangement is illustrated in Figures 6 to 8, wherein the vessel 110 is provided with an inlet 111, outlet 112 and a drain 116 with a strainer or screen 115 located between the inlet and the outlet. A spray head assembly B which includes two spray heads 121 and 122 disposed at desired angles and mounted on a rotatable shaft 120 is mounted within an end closure 119. A hinge bracket 143 hinged on a pin 152 to a supporting bracket 145 is bolted at 151 and 148 to the closure and spray head assembly. The closure 119 is adapted to be connected to the open upper end of the vessel 110 by a coupling collar 134a which has wedge elements or shelves coacting with complementary wedge elements or shelves on the closure.

The operation of this form is identical to the

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form heretofore described and as shown in Figure 7, the closure 119 and spray head assembly may be swung outwardly to permit free access to the interior of the vessel. The particular strainer or screen 15 and 115 which is employed may be of any desired construction but preferably includes a cylindrical backing element 60 (Figure 8) having openings 61 therein with an annular screen 62 disposed within the member 60. The openings 61 are preferably in longitudinal alignment to assure proper backing strength in the backing member 60.

It is evident that the invention contemplates the provision of a rotatable spray head assembly which includes a plurality of spray heads; the particular number of heads may vary and the disposition of each head is such that the spray nozzles direct concentrated streams of cleaning fluid against the internal surface of the screen or strainer at the desired angle which will most efficiently clean said surface. As has been noted, the provision of the rotating spray heads permits a lesser number of nozzles to be employed, while maintaining cleaning efficiency, and this results in lesser cleaning fluid being required for the cleaning operation.

Having described the invention, I claim:

1. A cleaning apparatus including, a vessel having an inlet, an outlet and a drain, a tubular screen between said inlet and outlet and having one end opening toward said drain, that end of the vessel opposite the drain being open, a hinged closure for closing the open end of the vessel, and a spray head assembly mounted on the closure and extending into the vessel adjacent that end of the screen opposite the drain, said spray head assembly including a tubular rotatable shaft disposed axially of the screen, spray heads mounted on said shaft at an inclination with respect to the axis of the shaft, each spray head having nozzles which are inclined with respect to the internal surface of the screen, and means for supplying fluid to the tubular

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shaft and spray heads whereby concentrated streams of fluid are directed onto the interior surface of the screen and also whereby the fluid moves longitudinally through the screen to the drain.

2. A cleaning apparatus as set forth in claim 1, wherein the tubular shaft is constructed in sections which are connected by a coupling, whereby the shaft sections may be disconnected to allow swinging of the closure to an open position.

3. A cleaning apparatus including, a vessel having an inlet, an outlet and a drain, a tubular screen between said inlet and outlet and having one end opening toward said drain, a rotatable spray head within the other end of said screen and having nozzles to discharge a cleaning fluid longitudinally through the screen and upon the interior surface of said screen, said spray head being disposed at an angle with respect to the longitudinal axis of said screen whereby concentrated streams of cleaning fluid are discharged from said nozzles at an angle to the axis of said screen and upon the interior surface of said screen.

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